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Title : Classification of dives of beluga whales from the St Lawrence Estuary, Canada, using depth and velocity profiles.

Category : Ecology

Student :

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Abstract : Nine succion-cup attached time-depth-velocity recorders (TDRs) were deployed and retrieved after 42 min to 20.5 h (median = 5.6 h) from St Lawrence beluga whales, providing 61 h of diving data. Seven of nine TDRs contained usable information on both depth and velocity profiles. The proportion of time animals spent within 5 m from the surface averaged 38.6% (range: 26.8-64.3%; 95% CI 30.2-47.0%). The 5-m limit in depth corresponds to the mid-range of depths where beluga whales are visible from an aerial platform in the St Lawrence Estuary. Dive maximum depth was limited by bathymetry, and varied from 53 to 143 m between individuals. Dive maximum duration varied from 4,1 to 9.7 min between individuals.

A total of 979 dives exceeded 5 m, and were characterized using 17 variables related to depth and velocity profiles and a combination of principal components analysis (PCA) and hierarchical and nonhierarchical clustering analysis. The PCA reduced the 17 variables into 5 orthogonal factors which explained 89% of the total variance. Dives were classified into eight distinct types, as indicated by a low cross-validation error rate (5.0%). Two of eight dive types were U-shaped. One type had near zero swimming velocities during bottom time, constant bottom depth, and long periods at the surface (logging), while the other type had velocities greater than 1 m/s throughout the dive and varying bottom depths (wiggles) suggestive of foraging activity. The other six dive types were variations of more or less V-shaped dives, and segregated on the basis of ascent and descent rates, and swimming velocities. Although a variety of different behaviours were captured through the analysis of the collected diving data, a larger sample size is needed to insure an accurate and complete description of the repertoire of diving activities of beluga whales in the St Lawrence Estuary.